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**Jung**

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- (54) **SIDE BRACKET FOR HOLDING SPRINKLER JOINT**
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Jul. 25, 2014 (KR) ..... 10-2014-0094727  
Jan. 29, 2015 (KR) ..... 10-2015-0014335

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*F16B 7/04* (2006.01)  
*F16B 2/14* (2006.01)  
*A62C 35/68* (2006.01)  
(52) **U.S. Cl.**  
CPC ..... *F16B 7/0493* (2013.01); *A62C 35/68* (2013.01); *F16B 2/14* (2013.01)

(58) **Field of Classification Search**  
CPC ..... A62C 37/00; A62C 35/00; A62C 35/68; F16L 3/24; F16B 7/0493  
See application file for complete search history.

- (56) **References Cited**  
U.S. PATENT DOCUMENTS
- 4,041,657 A \* 8/1977 Schuplin ..... E04B 9/006 248/343
- 6,260,810 B1 \* 7/2001 Choi ..... F16L 3/24 248/317
- 7,264,214 B2 \* 9/2007 Oh ..... A62C 35/68 169/16
- 7,506,845 B2 \* 3/2009 Oh ..... F16L 3/24 248/72
- 2005/0139743 A1 \* 6/2005 Shim ..... E04B 9/006 248/342
- 2011/0094760 A1 \* 4/2011 Im ..... A62C 35/68 169/51

\* cited by examiner  
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(57) **ABSTRACT**  
Provided is a side bracket for holding a sprinkler joint by clamping a square bar to two channeled rails, the channeled rails being arranged in parallel at regular intervals so as to hold ceiling boards, with horizontal wings provided along opposite side edges of each of the channeled rails, and the square bar crossing the two channeled rails. The side bracket includes: a pair of support sides; an upper connection part connecting upper ends of the support sides; clamp parts provided on lower ends of the support sides so as to be clamped to a channeled rail; and a space adjustment unit provided on lower parts of the support sides of the side bracket. The side bracket can be easily and simply clamped to a wing of a channeled rail while providing a firm clamping structure.

**3 Claims, 15 Drawing Sheets**

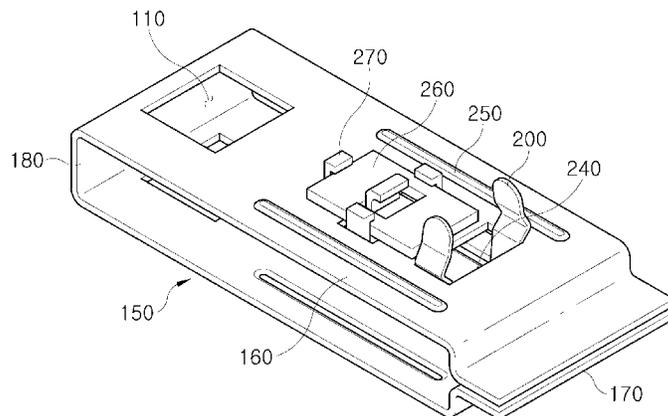


FIG. 1

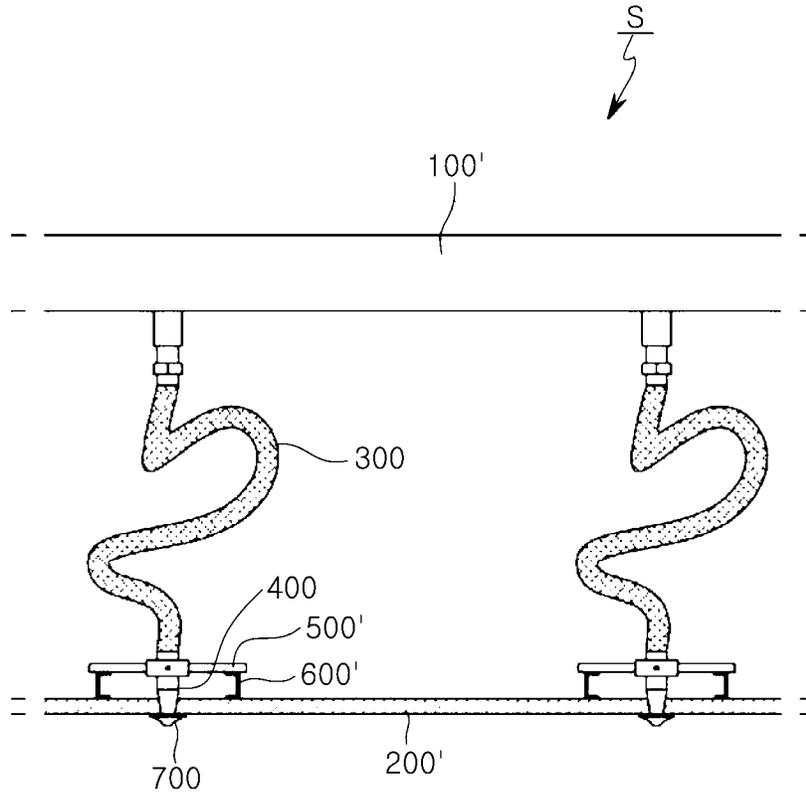


FIG. 2

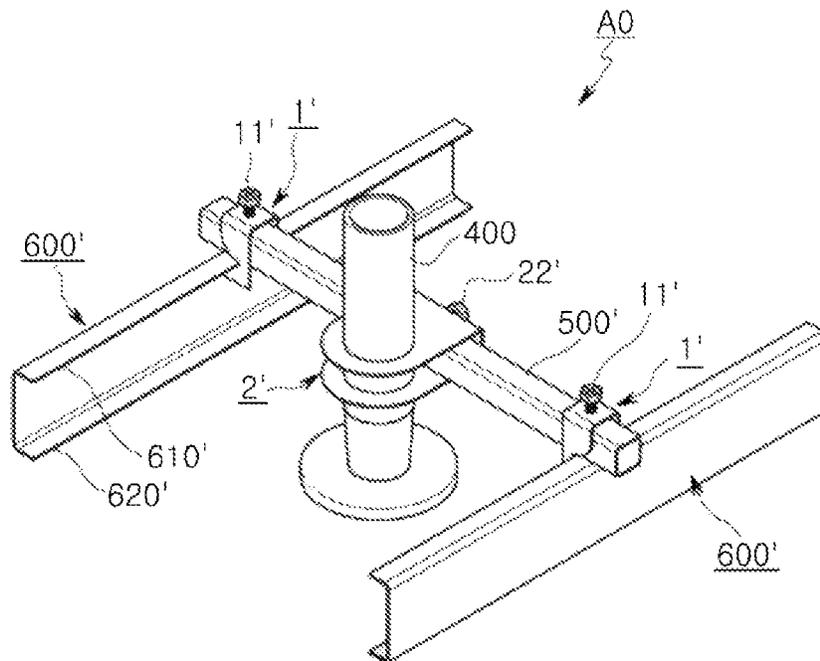


FIG. 3

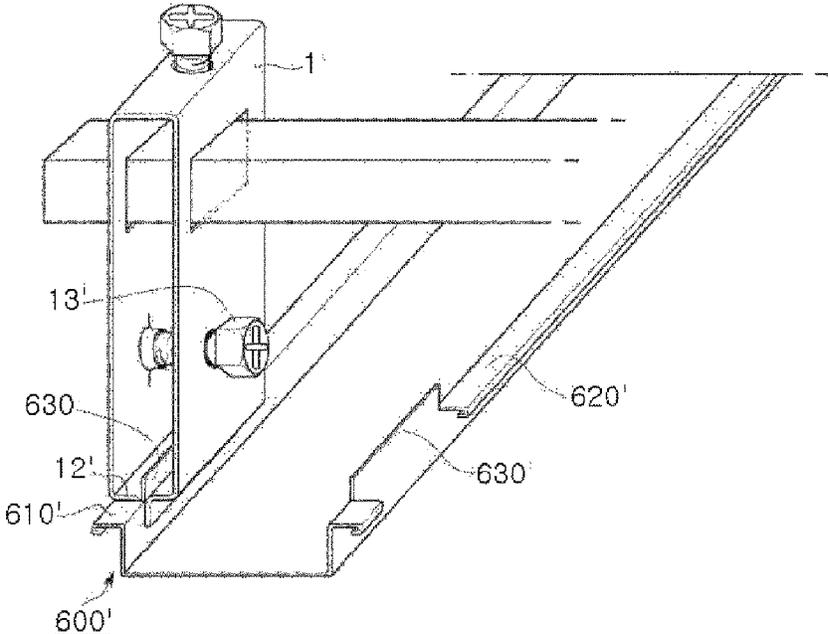


FIG. 4

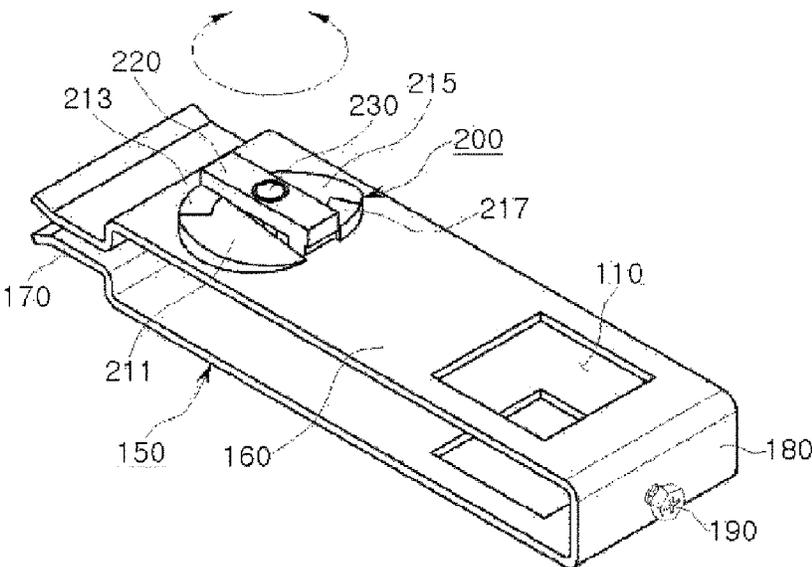


FIG. 5

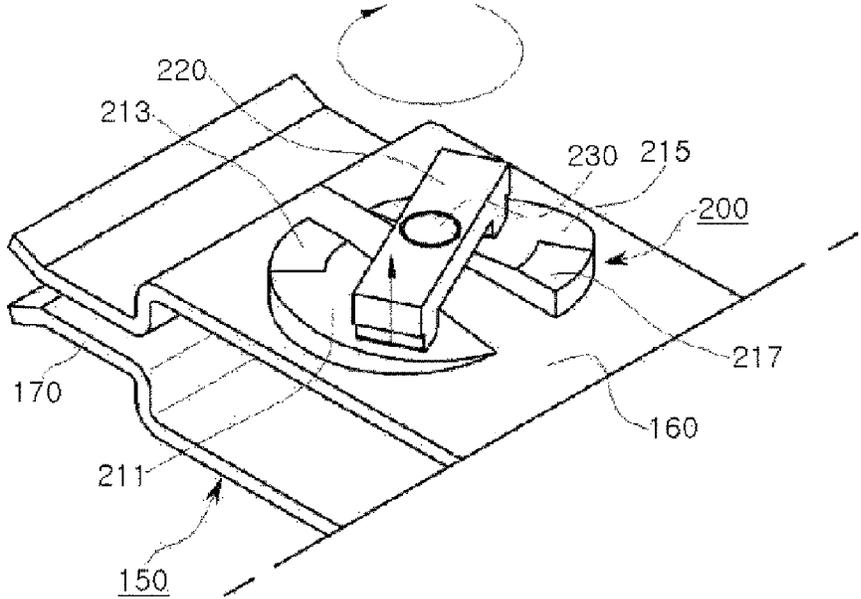


FIG. 6

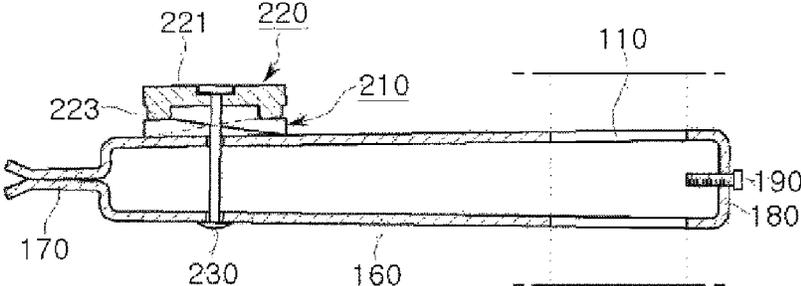


FIG. 7

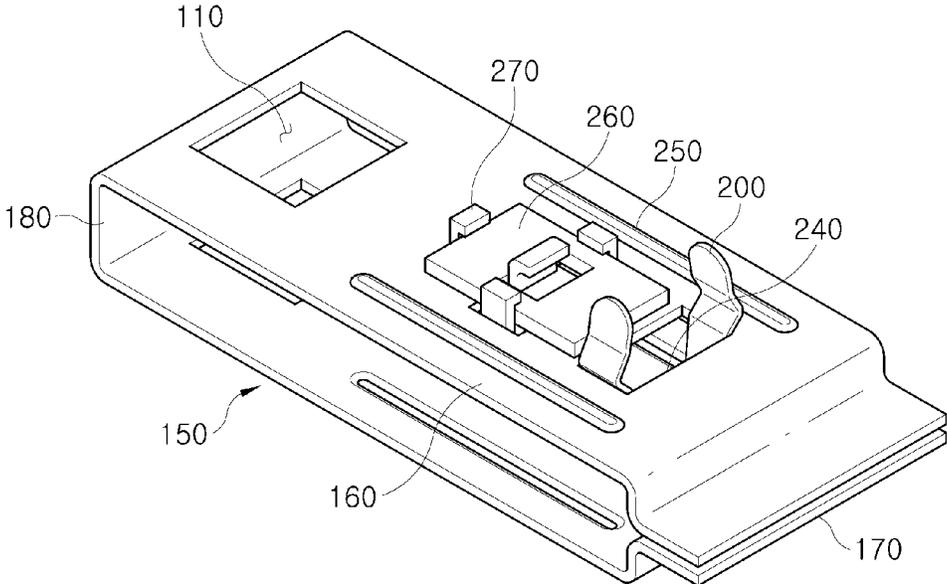


FIG. 8

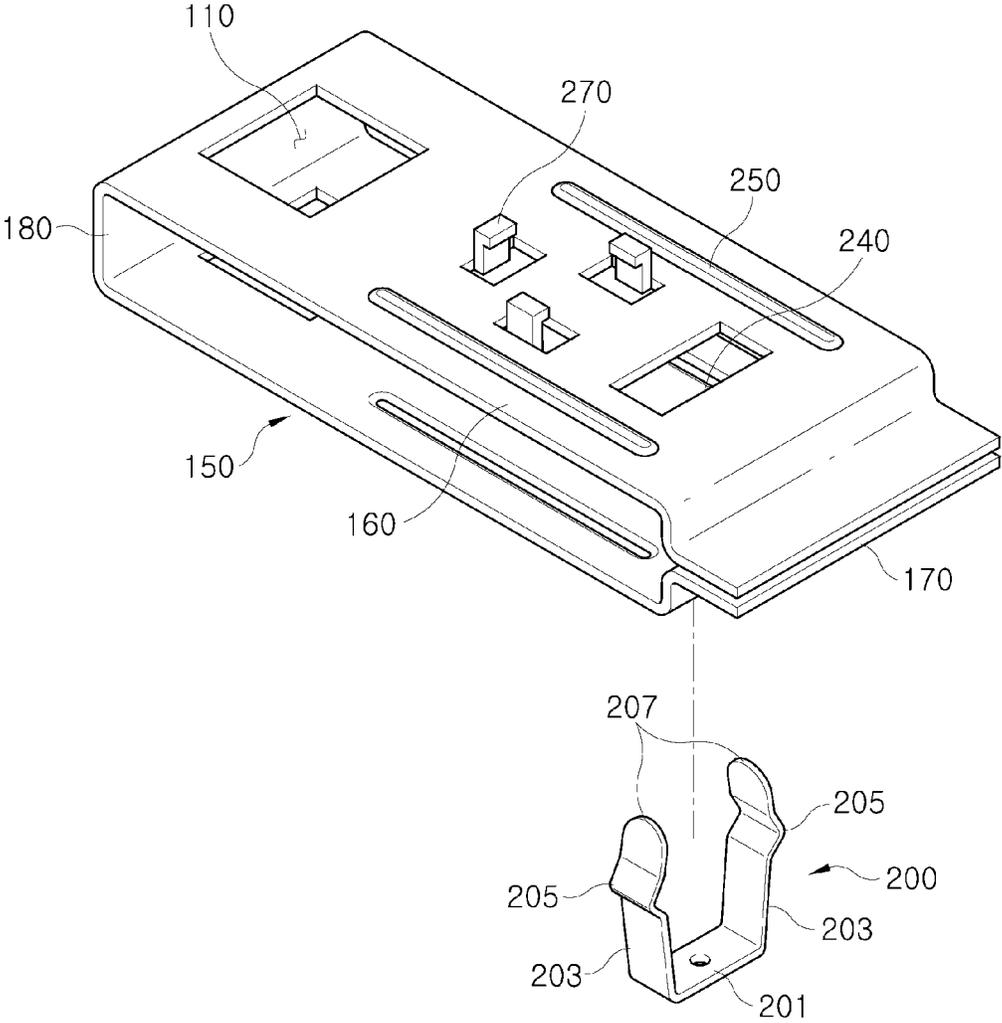


FIG. 9

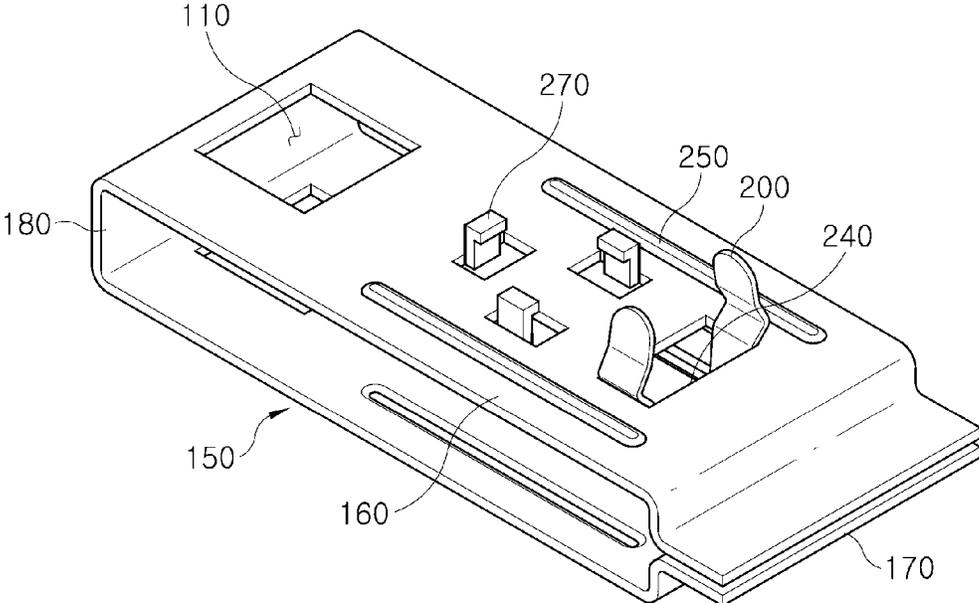


FIG. 10

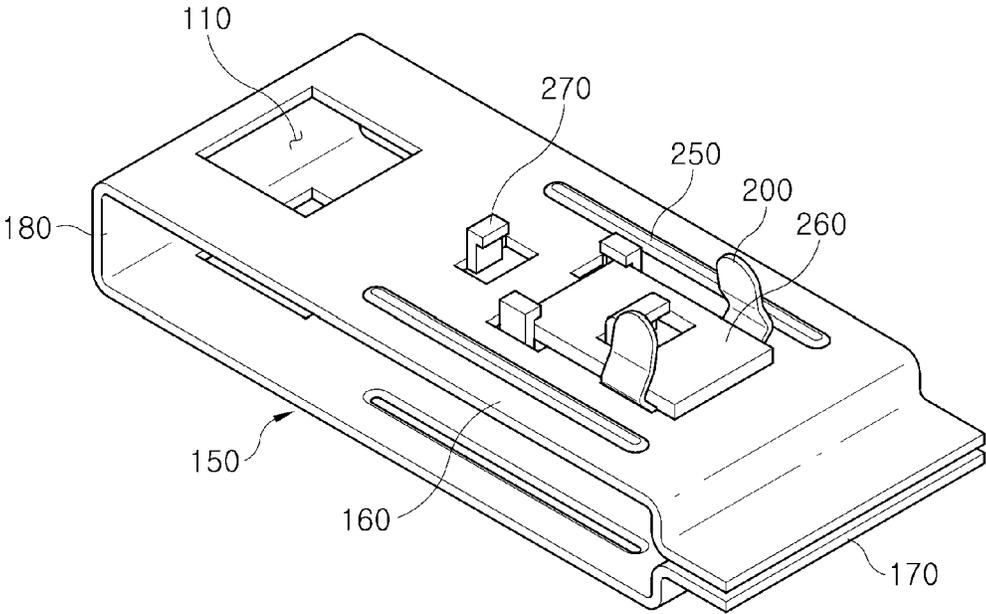


FIG. 11

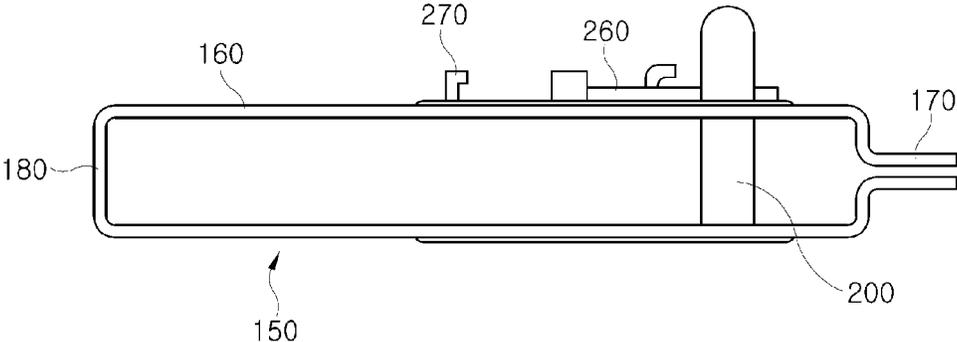


FIG. 12

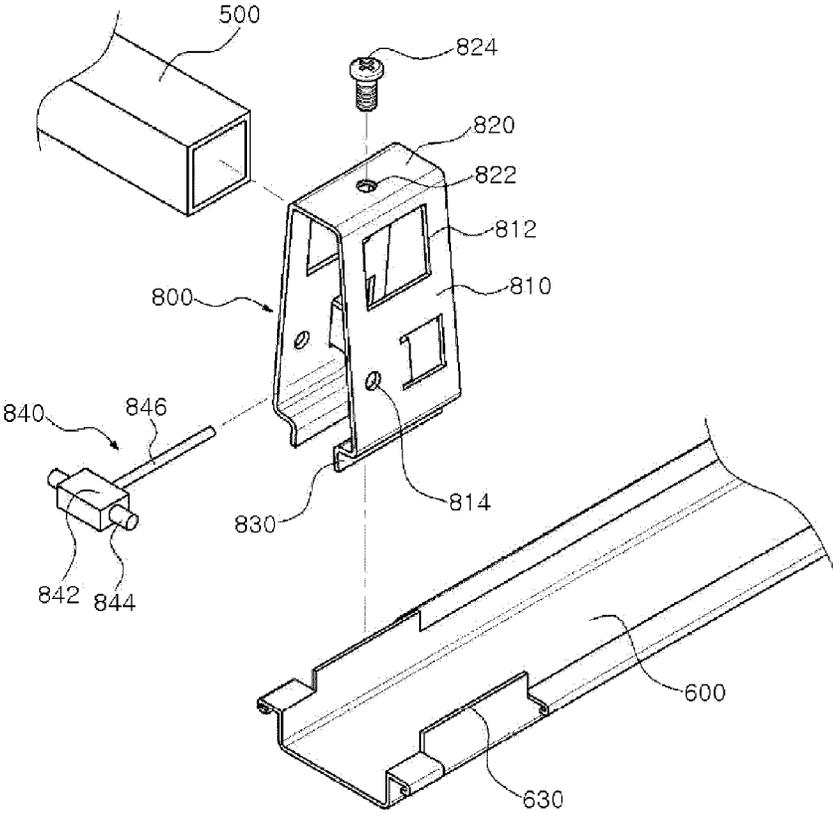


FIG. 13

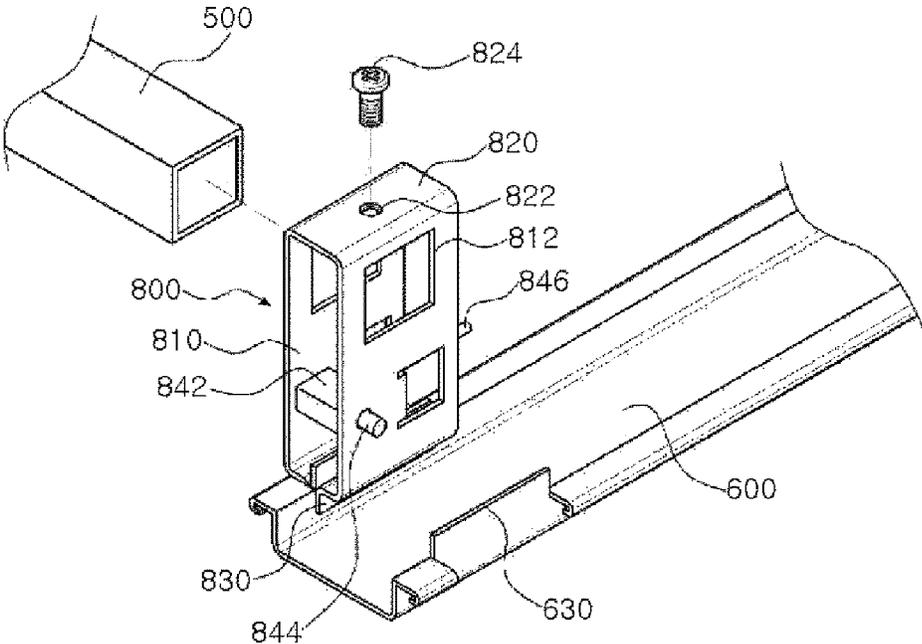


FIG. 14A

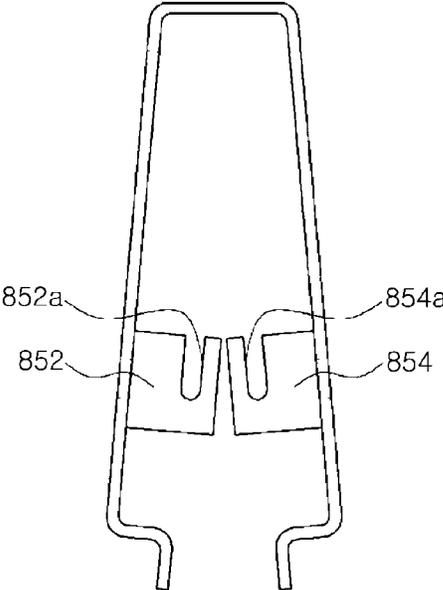


FIG. 14B

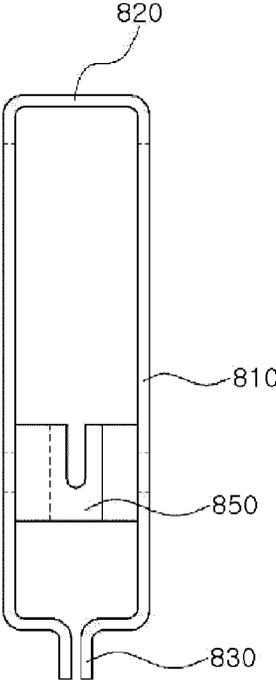


FIG. 15

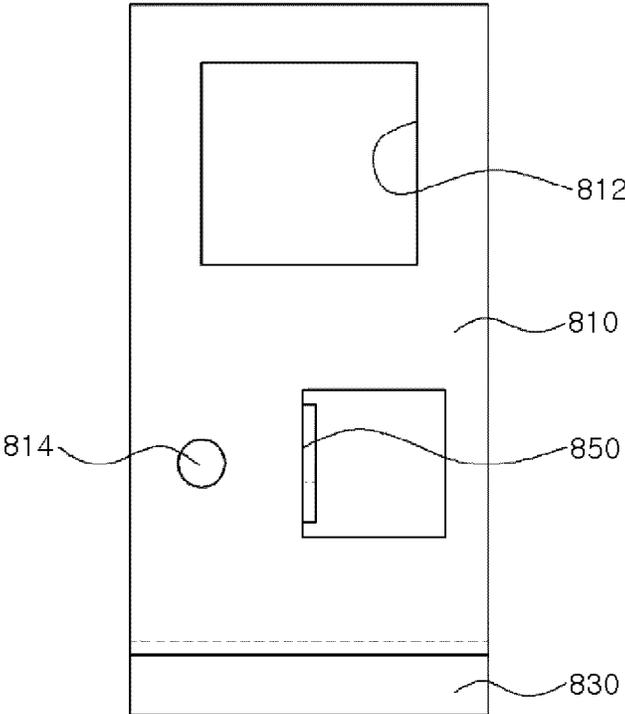


FIG. 16

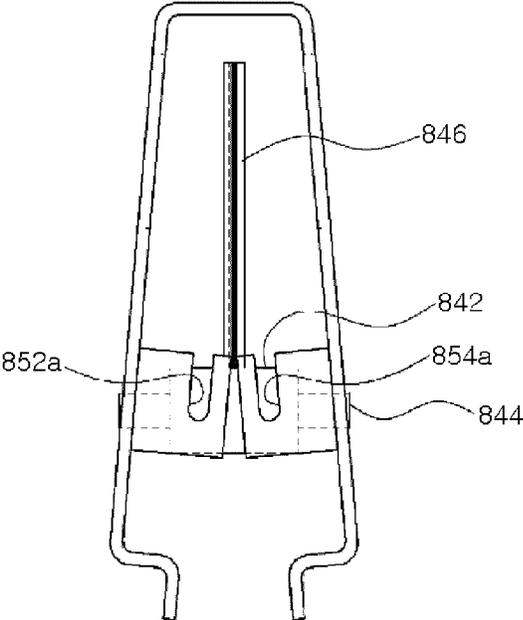


FIG. 17

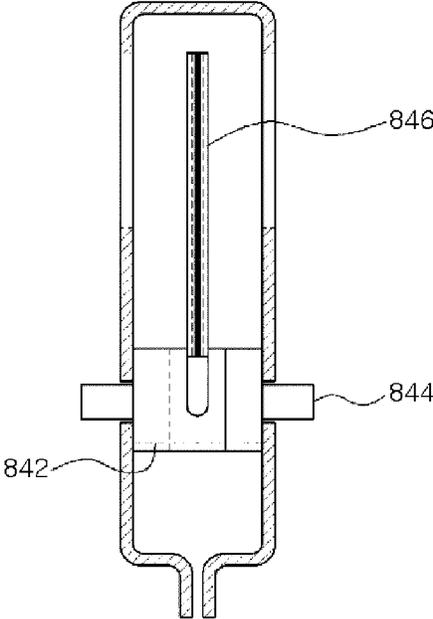


FIG. 18

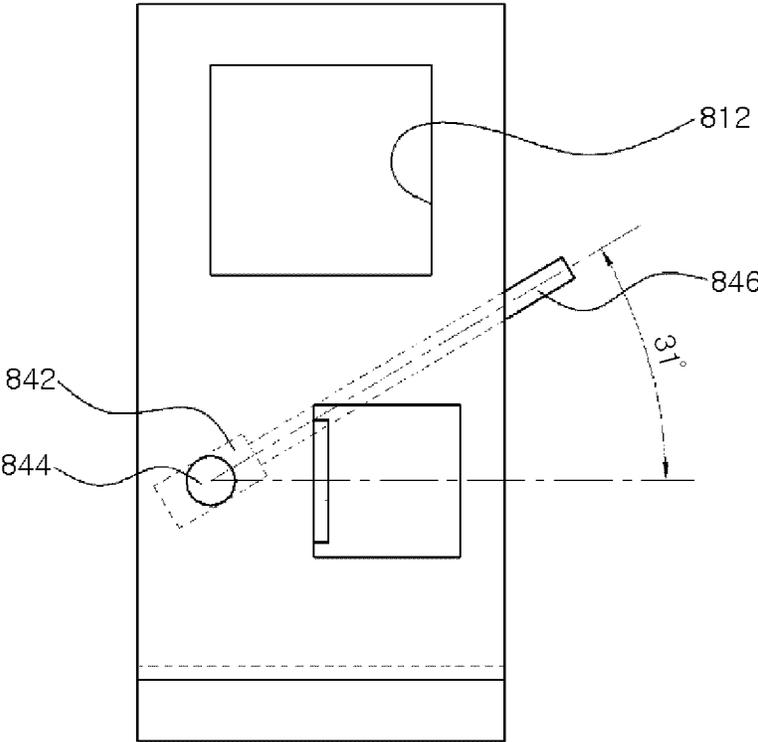


FIG. 19

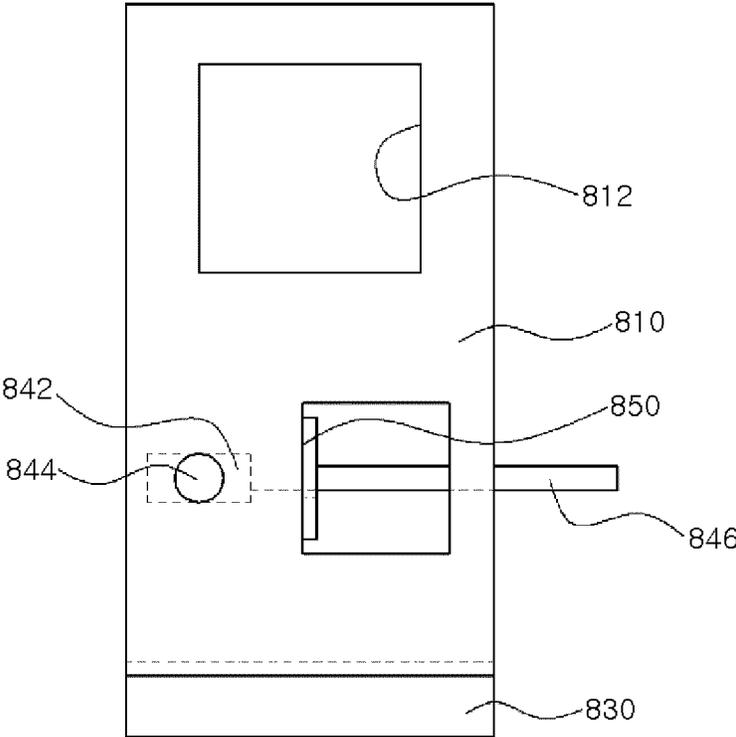
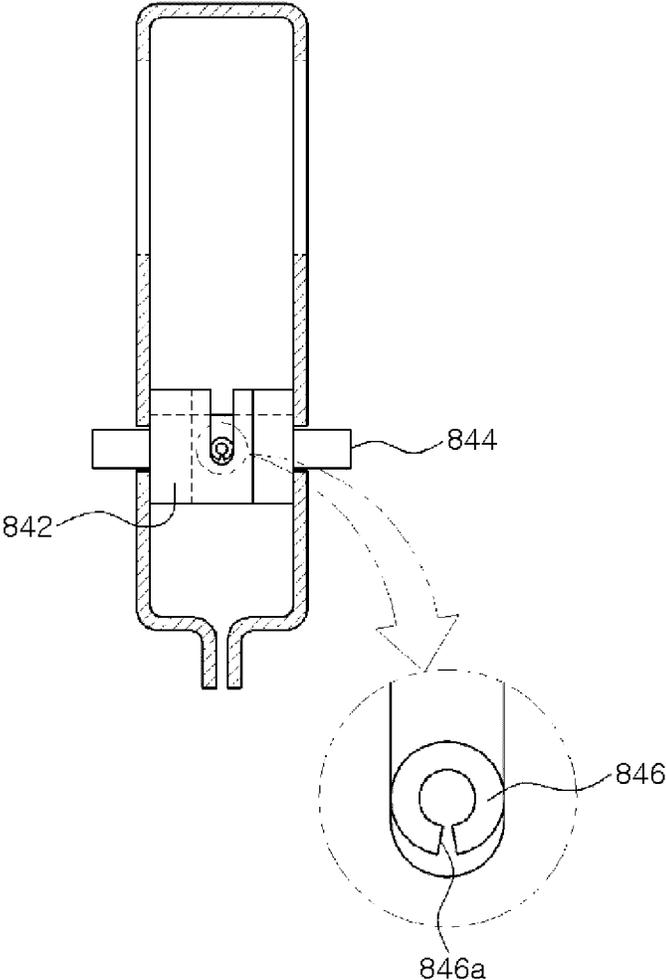


FIG. 20



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## SIDE BRACKET FOR HOLDING SPRINKLER JOINT

### CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of Korean Patent Application Nos. 10-2014-0094725, 10-2014-0094727 and 10-2015-0014335, filed on Jul. 25, 2014, Jul. 25, 2014 and Jan. 29, 2015 respectively which are hereby incorporated by reference in their entirety into this application.

### BACKGROUND OF THE INVENTION

#### Field of the Invention

A side bracket for holding a sprinkler joint, which can form a sprinkler joint holding structure by combining a square bar with channeled rails in a lattice pattern, and which can be easily and simply clamped to a wing of a channeled rail while providing a firm clamping structure.

The present invention generally relates to a side bracket for holding a sprinkler joint. More particularly, the present invention relates to a side bracket for holding a sprinkler joint, which can form a sprinkler joint holding structure by combining a square bar with channeled rails in a lattice pattern, and which can be easily and simply clamped to a wing of a channeled rail while providing a firm structure.

#### Description of the Related Art

Generally, a sprinkler system is an automatic fire-fighting system configured such that a fuse of the system automatically melts in response to a fire, and water for fire-fighting is sprayed from a sprinkler head mounted to a ceiling board, thereby fighting the fire and informing persons of the fire.

FIG. 1 is a view showing a conventional sprinkler system.

As shown in FIG. 1, the conventional sprinkler system S includes: a main pipe 100' that supplies water for fire-fighting; a flexible hose 300 branching from the main pipe 100'; a reducer 400 mounted to the lower end of the flexible hose 300; and a sprinkler head 700 mounted to the lower end of the reducer 400, wherein the sprinkler head 700 is held on a ceiling board 200' by fitting the sprinkler head 700 into a through hole formed in the ceiling board 200'.

Here, the flexible hose 300, the reducer 400, and the sprinkler head 700 form a unit so-called a sprinkler joint.

FIG. 2 is a perspective view showing a conventional structure for holding a lower part of a sprinkler joint.

As shown in FIGS. 1 and 2, the conventional structure A0 for holding the sprinkler joint includes: two channeled rails 600' each having a U-shaped cross-section, the channeled rails 600' being arranged in parallel at regular intervals in a ceiling so as to hold ceiling boards 200'; a square bar 500' crossing the two channeled rails 600', and side brackets 1' that clamp the square bar 500' to the two channeled rails 600'.

The structure A0 further includes: a central holding bracket 2' that is clamped to a central portion of the square bar 500', and is provided with a through hole for holding the reducer 400, with a locking bolt 22' fastened to a connection part of the central holding bracket 2' such that the locking bolt 22' can press a side surface of the square bar 500'.

Each of the channeled rails 600' has a U-shaped cross-section that is formed by bending opposite side edges of a metal panel to form opposite wings 610' and 620'. When arranging the channeled rails 600' in the ceiling, each of the channeled rails 600' may be set on an edge such that the opposite wings 610' and 620' are placed up and down. Here, the two channeled rails 600' may be set to face each other.

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The side bracket 1' having a slit on a front part thereof is fitted over the upper wing 610' of a channeled rail 600', and is fastened to the upper wing 610' by another locking bolt 11' engaged with an upper connection part of the side bracket 1', so that the side bracket 1' is clamped to the channeled rail 600'.

However, the above-mentioned structure is problematic in that because each of the channeled rails 600' is set on an edge, the contact of the channeled rail 600' with the ceiling board 200' cannot provide a sufficient contact surface, so that the structure may fail to provide a sufficient force for holding a sprinkler joint.

In an effort to solve the problem, the channeled rails 600' may be set in a ceiling such that the wide surface of each of the channeled rails 600' is laid on a ceiling board 200'. However, when setting the channeled rail 600' such that the wide surface is laid on the ceiling board 200', it is impossible to install the conventional side bracket 1' on the channeled rail 600'.

FIG. 3 is a perspective view showing another conventional structure for holding a lower part of a sprinkler joint.

The structure shown in FIG. 3 is configured such that each of opposite wings 610' of each channeled rail 600' is partially cut, and the cut portion is bent upward to stand the portion upright, thereby forming a clamp support piece 630'.

Further, the lower parts of opposite support sides of a side bracket 1' are bent inward, thereby forming opposite clamp parts 12', and another locking bolt 13' is fastened to the opposite support sides of the side bracket 1'.

Thus, this structure can fasten the side bracket 1' to a channeled rail 600' by tightening the locking bolt 13' after clamping the clamp parts 12' of the side bracket 1' to the clamp support piece 630' of the channeled rail 600'.

However, the structure of FIG. 3 is problematic in that when the structure is used over a lengthy period of time, the locking bolt 13' is gradually loosened due to repeated movement of a flexible hose 300 caused by water hammering, so that the clamping force of the structure is reduced, and the channeled rail 600' may be removed from the side bracket 1'.

The foregoing is intended merely to aid in the understanding of the background of the present invention, and is not intended to mean that the present invention falls within the purview of the related art that is already known to those skilled in the art.

### SUMMARY OF THE INVENTION

Accordingly, the present invention has been made keeping in mind the above problems occurring in the related art, and the present invention is intended to propose a side bracket for holding a sprinkler joint, which can form a sprinkler joint holding structure by combining a square bar with channeled rails in a lattice pattern, and which can be easily and simply clamped to a wing of a channeled rail while providing a firm clamping structure.

In order to achieve the above object, according to the first embodiment of the present invention, there is provided a side bracket for holding a sprinkler joint, the side bracket being used to clamp a square bar to two channeled rails, the channeled rails being arranged in parallel at regular intervals so as to hold ceiling boards, with horizontal wings provided along opposite side edges of each of the channeled rails, and the square bar crossing the two channeled rails, the side bracket including: a pair of support sides; an upper connection part connecting upper ends of the support sides; clamp parts provided on lower ends of the support sides so as to be

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clamped to a channeled rail; and a space adjustment unit provided on lower parts of the support sides of the side bracket, wherein the space adjustment unit includes: an inclined plate provided on an outer surface of one of the support sides; a rotatable part arranged on the inclined plate along a diametric centerline of the inclined plate; and a locking shaft passing the pair of support sides and connecting the inclined plate and the rotatable part to each other and to the support sides.

The inclined plate may be sectioned into two parts that are opposed to each other based on the diametric centerline of the inclined plate, with a first inclined surface provided on a first side of the inclined plate, a first flat part extending from an upper end of the first inclined surface, a second inclined surface provided on a second side of the inclined plate, and a second flat part extending from an upper end of the second inclined surface.

The first flat part and the second flat part may be configured as depressions so as to prevent pressure parts of the rotatable part from being removed from the first and second flat parts.

The rotatable part may include: a grip part that is rotated by a user holding the grip part with fingers; and a pair of pressure parts that protrudes downward from the grip part and is rotated while being in contact with the inclined plate, thereby pressing down the inclined plate.

In the side bracket, a first end of the locking shaft may be combined with a central portion of the rotatable part in such a way that the rotatable part can be rotated on the locking shaft, and a second end of the locking shaft may be fixed to a remaining one of the support sides on which the space adjustment unit is not provided.

According to the second embodiment of the present invention, there is provided a side bracket for holding a sprinkler joint, the side bracket being used to clamp a square bar to two channeled rails, the channeled rails being arranged in parallel at regular intervals so as to hold ceiling boards, with horizontal wings provided along opposite side edges of each of the channeled rails, and the square bar crossing the two channeled rails, the side bracket including: a pair of support sides; an upper connection part connecting upper ends of the support sides; clamp parts provided on lower ends of the support sides so as to be clamped to a channeled rail; and a space adjustment unit provided on lower parts of the support sides of the side bracket, wherein a guide hole is provided on one of the pair of support sides, and the space adjustment unit passes through the guide hole, and includes: a fixed part fixed to an inner surface of a remaining one of the support sides; a pair of elastic parts extending upward from the fixed part and having elasticity; a pair of pressing parts bent outward from the elastic parts; and a pair of grip parts extending upward from the pressing parts.

The space adjustment unit may further include: a fitting plate that can be fitted into a gap between the pair of pressing parts, the fitting plate being configured such that when the fitting plate is fitted into the gap between the pair of pressing parts, the fitting plate pushes the pressing parts in opposite directions, thereby holding the pressing parts at opened positions, and such that the fitting plate can be removably fitted into the gap between the pair of pressing parts by being slidably moved while being in contact with the support side having the guide hole; and a holder that is provided on the support side having the guide hole so as to hold the fitting plate such that even when the fitting plate is removed from

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the gap between the pair of pressing parts, the fitting plate is maintained in a contact position on the support side having the guide hole.

In the side bracket, a ridge may be integrally formed on each of the support sides.

In the side bracket, the space adjustment unit may be made of a plate spring material.

According to the third embodiment of the present invention, there is provided a side bracket for holding a sprinkler joint, the side bracket being used to clamp a square bar to channeled rails, the channeled rails being arranged in parallel at regular intervals so as to hold ceiling boards, with horizontal wings provided along opposite side edges of each of the channeled rails, and the square bar crossing the channeled rails, the side bracket including: a pair of support sides, with a through hole formed through each of the support sides so that the square bar can pass through the through holes of the support sides; an upper connection part connecting upper ends of the support sides; clamp parts provided on lower ends of the support sides so as to be clamped to a channeled rail; and a space adjustment unit provided between lower parts of the support sides, wherein a locking piece part is provided on the lower parts of the pair of support sides such that the locking piece part can be engaged with or disengaged from the space adjustment unit, so that when the locking piece part is engaged with the space adjustment unit, the locking piece part clamps the side bracket to a wing of the channeled rail.

The space adjustment unit may include: a block body placed between the pair of support sides; rotating shafts extending from opposite side surfaces of the block body and inserted into shaft holes provided in the pair of support sides; and a locking shaft extending from a surface of the block body such that the locking shaft extends in a direction perpendicular to an axis of the rotating shafts.

Here, the locking shaft may be configured as a hollow pipe, and may be provided with an axial slit that gives a clearance to the locking shaft.

The axial slit may be configured such that opposed edge surfaces of the axial slit are inclined to be further opened as the axial slit goes in a radially outward direction toward an outer circumferential surface of the locking shaft.

The locking piece part may include: a first locking piece and a second locking piece that are provided by partially cutting the pair of support sides so as to form cut parts and by bending the cut parts inwards.

Here, each of the first and second locking pieces may be provided with a U-shaped fitting slit extending downward to a depth, so that the locking shaft of the space adjustment unit can be inserted into the fitting slits of the first and second locking pieces.

The fitting slits may be configured such that when the locking shaft is completely fitted into the fitting slits, the locking shaft can be placed horizontally.

Further, the fitting slits may include: a first fitting slit provided in the first locking piece; and a second fitting slit provided in the second locking piece, wherein locations of the first and second fitting slits may be determined such that when the pair of support sides is compressed, the fitting slits are aligned with each other.

Further, the lengths of the rotating shafts may be determined such that even when the support sides are opened from each other, the rotating shafts can be maintained in the respective shaft holes.

As described above, the present invention is advantageous in that when forming a sprinkler joint holding structure by combining a square bar with channeled rails in a lattice

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pattern, the side bracket of the present invention can be easily and simply clamped to a wing of a channeled rail.

Another advantage of the present invention resides in that the clamped state of the side bracket is less likely to be loosened after clamping the side bracket to the wing of the channeled rail.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a view showing a conventional sprinkler system;

FIG. 2 is a perspective view showing a conventional structure for holding a lower part of a sprinkler joint;

FIG. 3 is a perspective view showing another conventional structure for holding a lower part of a sprinkler joint;

FIG. 4 is a perspective view showing a side bracket for holding the sprinkler joint according to the first embodiment of the present invention;

FIG. 5 is a perspective view showing an operation of the side bracket for holding the sprinkler joint according to the first embodiment of the present invention;

FIG. 6 is a sectional view showing the side bracket for holding the sprinkler joint according to the first embodiment of the present invention;

FIG. 7 is a perspective view showing a side bracket for holding a sprinkler joint according to the second embodiment of the present invention;

FIG. 8 is an exploded perspective view showing the side bracket for holding the sprinkler joint of FIG. 7;

FIGS. 9 and 10 are perspective views showing an operation of the side bracket for holding the sprinkler joint according to the second embodiment of the present invention;

FIG. 11 is a side view showing the side bracket for holding the sprinkler joint according to the second embodiment of the present invention;

FIG. 12 is an exploded perspective view showing a side bracket for holding a sprinkler joint according to the third embodiment of the present invention;

FIG. 13 is a perspective view showing a state of the side bracket of FIG. 12 clamped to a wing of a channel rail;

FIGS. 14A and 14B are side views showing an operation of the side bracket according to the third embodiment of the present invention in which the space between the support sides of the side bracket is increased or reduced;

FIG. 15 is a front view showing one of the support sides of the side bracket according to the third embodiment of the present invention;

FIG. 16 is a side view showing an open state of the side bracket having a space adjustment unit according to the third embodiment of the present invention;

FIG. 17 is a sectional view showing the side bracket for holding the sprinkler joint according to the third embodiment of the present invention;

FIG. 18 is a front view showing an operation of the side bracket for holding the sprinkler joint according to the third embodiment of the present invention;

FIG. 19 is a front view showing a compressed state of the side bracket according to the third embodiment of the present invention; and

FIG. 20 is a sectional view showing the compressed state of the side bracket according to the third embodiment of the present invention.

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#### DETAILED DESCRIPTION OF THE INVENTION

Hereinbelow, exemplary embodiments of a side bracket for holding a sprinkler joint according to the present invention will be described in detail with reference to the accompanying drawings. Throughout the drawings, the same reference numerals will refer to the same or like parts.

FIG. 4 is a perspective view showing a side bracket for holding a sprinkler joint according to the first embodiment of the present invention. FIG. 5 is an enlarged perspective view of a space adjustment unit of the side bracket shown in FIG. 4. FIG. 6 is a sectional view of FIG. 4.

As shown in FIGS. 4 to 6, the side bracket 150 according to the first embodiment of the present invention is used to clamp a square bar 500 to two channeled rails 600. Here, the channeled rails 600 are arranged in parallel at regular intervals in a ceiling so as to hold ceiling boards 200, with horizontal wings provided along opposite side edges of each of the channeled rails 600. The square bar 500 crosses the two channeled rails 600.

Further, a reducer 400 (see FIG. 2) may be clamped to a central portion of the square bar 500 using a central holding bracket, with a sprinkler head being mounted to the reducer.

The side bracket 150 includes: a pair of support sides 160; an upper connection part 180 that connects the upper ends of the support sides 160; and clamp parts 170 provided on the lower ends of the support sides 160 so as to clamp the side bracket 150 to a channeled rail 600.

A space adjustment unit 200 is provided on lower parts of the support sides 160 of the side bracket 150, and a through hole 110 is formed through an upper part of each of the support sides 160 so that the square bar 500 can pass through the through holes 110 of the support sides 160.

The space adjustment unit 200 is a device that controls the gap between the pair of support sides 160 so that the clamp parts 170 can be opened or closed by the operation of the space adjustment unit 200.

Accordingly, the pair of clamp parts 170 can be firmly clamped to the channeled rail 600 by tightly compressing the clamp parts 170 with the channeled rail 600 interposed between the clamp parts 170.

The space adjustment unit 200 includes: an inclined plate 210 provided on the outer surface of one of the support sides 160; a rotatable part 220 arranged on the inclined plate 210 along a diametric centerline of the inclined plate 210; and a locking shaft 230 that passes the pair of support sides 160 and connects the inclined plate 210 and the rotatable part 220 to each other and to the support sides 160.

The inclined plate 210 is sectioned into two parts that are opposed to each other based on the diametric centerline of the inclined plate 210. On the inclined plate 210, a first inclined surface 211 is provided on a first side of the inclined plate 210, a first flat part 213 extends from an upper end of the first inclined surface 211, a second inclined surface 215 is provided on a second side of the inclined plate 210, and a second flat part 217 extends from an upper end of the second inclined surface 215.

Further, the rotatable part 220 is rotatably arranged along the diametric centerline of the inclined plate 210, and includes: a grip part 221 that is rotated by a user holding the grip part 221 with fingers; and a pair of pressure parts 223 that protrudes downward from the grip part 221 and is rotated while being in contact with the inclined plate 210, thereby pressing down the inclined plate 210.

Here, the pair of pressure parts 223 is rotated while being in contact with the first inclined surface 211 and the second

inclined surface **215**, respectively, thereby pressing down the first and second inclined surfaces **211** and **215**. The pair of pressure parts **223** stops the rotation thereof when reaching the first flat part **213** and the second flat part **217**, respectively.

Here, the first flat part **213** and the second flat part **217** may be configured as shallow depressions so as to prevent the two pressure parts **223** from being removed from the flat parts **213** and **217**.

The first end of the locking shaft **230** is combined with the central portion of the grip part **221** of the rotatable part **220** in such a way that the rotatable part **220** can be rotated on the locking shaft **230**. The second end of the locking shaft **230** is fixed to a remaining one of the support sides **160** on which the space adjustment unit **200** is not provided.

Further, a locking bolt **190** is fastened to the upper connection part **180** of the side bracket **150**. In the same manner as that described for the conventional structure, the locking bolt **190** functions to fasten the square bar **500** that passes through the through holes **110**.

Hereinbelow, the operation of the side bracket for holding the sprinkler joint according to the first embodiment of the present invention will be described.

To clamp the square bar **500** to each of the two channeled rails **600** that are arranged in parallel at regular intervals in the ceiling so as to hold the ceiling boards, the side bracket **150** is installed on each of the channeled rails **600**.

In other words, after fitting the clamp parts **170** of the side bracket **150** over the wing of the channeled rail **600**, the rotatable part **220** of the space adjustment unit **200** is rotated.

When rotating the rotatable part **220** as described above, the pair of pressure parts **223** moves toward the upper parts of the first and second inclined surfaces **211** and **215** of the inclined plate **210** while being in contact with the inclined surfaces **211** and **215**, respectively. When the two pressure parts **223** move on the respective inclined surfaces **211** and **215** as described above, the pressure parts **223** press the inclined plate **210** so that the support side **160** having the inclined plate **210** is pressed along the locking shaft **230** in a direction toward the support side **160** having no inclined plate **210**.

Accordingly, the clamp parts **170** integrated with the support sides **160** are tightly closed, and compress the wing of the channeled rail **600** placed between the clamp parts **170**, so that the side bracket **150** is tightly clamped to the channeled rail **600**.

Here, after the pressure parts **223** pass over the upper parts of the first and second inclined surfaces **211** and **215**, the pressure parts **223** are seated on the first flat part **213** and the second flat part **217**, respectively. On the first flat part **213** and the second flat part **217**, the pressure parts **223** are stably seated without further moving.

FIG. 7 is a perspective view showing a side bracket for holding a sprinkler joint according to the second embodiment of the present invention. FIG. 8 is an exploded perspective view showing the side bracket for holding the sprinkler joint of FIG. 7. FIGS. 9 and 10 are perspective views showing an operation of the side bracket for holding the sprinkler joint according to the second embodiment of the present invention. FIG. 11 is a side view showing the side bracket for holding the sprinkler joint according to the second embodiment of the present invention.

As shown in FIGS. 7 to 9, the side bracket **150** for holding the sprinkler joint according to the second embodiment of the present invention is used to clamp a square bar **500** to two channeled rails **600**. Here, the channeled rails **600** are arranged in parallel at regular intervals in a ceiling and used

to hold ceiling boards **200'**, with horizontal wings provided along opposite side edges of each of the channeled rails **600**. The square bar **500** crosses the two channeled rails **600**.

Further, a reducer **400** (see FIG. 2) may be clamped to a central portion of the square bar **500** using a central holding bracket, with a sprinkler head being mounted to the reducer.

The side bracket **150** includes: a pair of support sides **160**; an upper connection part **180** that connects the upper ends of the support sides **160**; and clamp parts **170** provided on the lower ends of the support sides **160** so as to clamp the side bracket **150** to a channeled rail **600**.

One of the pair of support sides **160** is provided with a guide hole **240** at a predetermined position. Further, a ridge **250** is integrally formed on each of the support sides **160**. Here, the ridge **250** has a profile that extends outside the guide hole **240**. Although the guide hole **240** is configured as a rectangular shape in the embodiment of the present invention, it should be understood that the shape of the guide hole **240** may be freely changed as desired.

A through hole **110** is formed through an upper part of each of the support sides **160** so that the square bar **500** can pass through the through holes **110** of the support sides **160**.

In the second embodiment, the ridge **250** is provided as a reinforcement part that increases the strength of the support sides **160**.

A space adjustment unit **200** is installed in the side bracket **150** by passing through the guide hole **240**. In other words, the first end of the space adjustment unit **200** is fixed to the inner surface of the support side **160** having no guide hole **240**, and the second end of the space adjustment unit **200** passes through the guide hole **240** to be exposed outside the support side **160** having the guide hole **240**.

The space adjustment unit **200** is a device that controls the gap between the pair of support sides **160** so that the clamp parts **170** can be opened or closed by the operation of the space adjustment unit **200**.

Accordingly, the pair of clamp parts **170** can be firmly clamped to the channeled rail **600** by tightly compressing the clamp parts **170** with the channeled rail **600** interposed between the clamp parts **170**.

As shown in FIG. 8, the space adjustment unit **200** includes: a fixed part **201** fixed to the inner surface of the support side **160** having no guide hole **240**; a pair of elastic parts **203** extending upward from the fixed part **201** and having elasticity; a pair of pressing parts **205** bent outward from the elastic parts **203** to form respective ridges; and a pair of grip parts **207** extending upward from the pressing parts **205**.

Here, the space adjustment unit **200** may be made of a plate spring material.

Further, a locking bolt (not shown) is fastened to the upper connection part **180** of the side bracket **150**. In the same manner as that described for the conventional structure, the locking bolt functions to fasten the square bar **500** that passes through the through holes **110**.

Here, to realize firmer clamping of the space adjustment unit **200** according to the second embodiment of the present invention, the space adjustment unit **200** may further include a fitting plate **260** that can be fitted into the gap between the pair of pressing parts **205**.

The width of the fitting plate **260** is determined such that when the fitting plate **260** is fitted into the gap between the pair of pressing parts **205**, the fitting plate **260** can push the pressing parts **205** in opposite directions, thereby holding the pressing parts **205** at opened positions. Further, the fitting plate **260** is configured to be removably fitted between the pair of pressing parts **205** by being slidably moved while

being in contact with the support side **160** having the guide hole **240**. To this end, a holder **270** may be provided on the support side **160** having the guide hole **240**. The holder **270** can hold the fitting plate **260** such that even when the fitting plate **260** is removed from the gap between the pair of pressing parts **205**, the fitting plate **260** can be maintained in a contact position on the support side **160** having the guide hole **240**.

Hereinbelow, the operation of the side bracket for holding the sprinkler joint according to the second embodiment of the present invention will be described.

To clamp the square bar **500** to each of the two channeled rails **600** that are arranged in parallel at regular intervals in the ceiling so as to hold the ceiling boards, the side bracket **150** is installed on each of the channeled rails **600**. At this time, the pressing parts **205** of the space adjustment unit **200** are placed between the pair of support sides **160** of the side bracket **150**.

In other words, after fitting the clamp parts **170** of the side bracket **150** over the wing of the channeled rail **600**, the pair of pressing parts **205** of the space adjustment unit **200** is pulled to be exposed outside the support side **160** having the guide hole **240** while compressing the pair of grip parts **207** with fingers gripping the grip parts **207** so as to reduce the gap between the support sides **160**. When the pair of grip parts **207** is released after exposing the pressing parts **205** outside the support side **160**, the pressing parts **205** are opened and placed on opposite edges of the guide hole **240** under pressure, thereby compressing the pair of support sides **160**.

Accordingly, the gap between the support sides **160** is reduced and the clamp parts **170** integrated with the support sides **160** are tightly closed, and compress the wing of the channeled rail **600** placed between the clamp parts **170**, so that the side bracket **150** is tightly clamped to the channeled rail **600**.

FIG. 12 is an exploded perspective view showing a side bracket for holding a sprinkler joint according to the third embodiment of the present invention. FIG. 13 is a perspective view showing a clamped state of the side bracket for holding the sprinkler joint of FIG. 12;

As shown in FIGS. 12 and 13, the side bracket **800** for holding the sprinkler joint according to the third embodiment of the present invention is used to clamp a square bar **500** to two channeled rails **600**. Here, the channeled rails **600** are arranged in parallel at regular intervals in a ceiling and used to hold ceiling boards, with horizontal wings **630** provided along opposite side edges of each of the channeled rails **600**. The square bar **500** crosses the two channeled rails **600**.

Further, a reducer **400** (see FIG. 2) may be clamped to a central portion of the square bar **500** using a central holding bracket, with a sprinkler head being mounted to the reducer.

The side bracket **800** includes: a pair of support sides **810** having respective through holes **812** through which the square bar **500** can pass; an upper connection part **820** that connects the upper ends of the support sides **810**; and clamp parts **830** provided on the lower ends of the support sides **810** so as to clamp the side bracket **800** to a channeled rail **600**.

Further, a locking bolt **824** is fastened to the upper connection part **820** of the side bracket **800**. In the same manner as that described for the conventional structure, the locking bolt **824** functions to fasten the square bar **500** that passes through the through holes **812**. The upper connection part **820** is provided with an internally threaded hole **822** to which the locking bolt **824** is tightened.

A space adjustment unit **840** is installed between the lower parts of the support sides **810**. The space adjustment unit **840** is a device that controls the gap between the pair of support sides **810** so that the clamp parts **830** can be opened or closed by the operation of the space adjustment unit **840**.

Accordingly, the pair of clamp parts **830** can be firmly clamped to the channeled rail **600** by tightly compressing the clamp parts **830** with the channeled rail **600** interposed between the clamp parts **830**.

In the present invention, the space adjustment unit **840** includes: a block body **842** placed between the pair of support sides **810**; rotating shafts **844** extending from opposite side surfaces of the block body **842** and inserted into shaft holes **814** provided in the pair of support sides **810**; and a locking shaft **846** extending from a surface of the block body **842** such that the locking shaft **846** extends in a direction perpendicular to an axis of the rotating shafts **844**.

Here, each of the rotating shafts **844** and the locking shaft **846** may be configured as a bar shape, and the block body **842** may be configured as a hexahedral shape. Here, the block body **842** may have a width that is equal to the gap between the pair of support sides **810** when the support sides **810** are compressed. Further, when assuming the axial direction of the side bracket **800** as a vertical direction in FIG. 17, the opposite side surfaces of the block body **842** may be configured as parallel vertical surfaces. Thus, when the support sides **810** are compressed, the opposite side surfaces of the block body **842** are brought into contact with the inner surfaces of associated support sides **810** while being in parallel to the inner surfaces of the support sides **810**.

The block body **842** and the locking shaft **846** of the space adjustment unit **840** can rotate about the rotating shafts **844** that are inserted into the respective shaft holes **814** of the support sides **810**. Here, the block body **842** and the locking shaft **846** can rotate at a predetermined angle, for example, 90° or more.

Further, a locking piece part **850** is provided on the lower parts of the pair of support sides **810** such that the locking piece part **850** can be engaged with or disengaged from the space adjustment unit **840**. When the locking piece part **850** is engaged with the space adjustment unit **840**, the locking piece part **850** clamps the side bracket **800** to a wing **630** of a channeled rail **600**.

FIGS. 14A and 14B are side views showing an operation of the side bracket according to the third embodiment of the present invention in which the space between the support sides of the side bracket is increased or reduced. FIG. 15 is a front view showing one of the support sides of the side bracket according to the third embodiment of the present invention;

As shown in the drawings, the locking piece part **850** may be provided by partially cutting the support sides **810** to form cut parts and by bending the cut parts inwards. In other words, although the locking piece part **850** may be provided by mounting a separate locking piece part to the support sides through, for example, welding, it is most preferred that the locking piece part **850** is provided by partially cutting the support sides **810** and by bending the cut parts inwards when considering the manufacturing cost and work efficiency.

Here, because the side bracket of the present invention **810** includes the pair of the support sides, the locking piece part **850** may comprise a first locking piece **852** and a second locking piece **854** that are provided by partially cutting the pair of support sides **810** so as to form cut parts and by bending the cut parts inwards.

As described above, the locking piece part **850** is configured to be engaged with or disengaged from the space adjustment unit **840**, thereby closing or opening the pair of support sides **810**. To this end, the first locking piece **852** and the second locking piece **854** are provided with U-shaped fitting slits **852a** and **854a**, respectively. Here, each of the U-shaped fitting slits **852a** and **854a** extends downward to a depth so that when the two fitting slits **852a** and **854a** are aligned with each other, the locking shaft **846** of the space adjustment unit **840** can be inserted into the two fitting slits **852a** and **854a**.

The fitting slits **852a** and **854a** comprise: a first fitting slit **852a** provided in the first locking piece **852**; and a second fitting slit **854a** provided in the second locking piece **854**. Here, the locations of the first and second fitting slits **852a** and **854a** are determined such that when the two support sides **810** are compressed, the two fitting slits **852a** and **854a** are aligned with each other, as shown in FIG. 14B.

In other words, as a means for locking the compressed positions of the support sides **810** after compressing the support sides **810**, the first and second locking pieces **852** and **854** are provided in the side bracket **800**, with the first and second fitting slits **852a** and **854a** formed in the first and second locking pieces **852** and **854**, respectively. Thus, when the locking shaft **846** is inserted into the first and second fitting slits **852a** and **854a** after aligning the first and second fitting slits **852a** and **854a** with each other by compressing the support sides **810**, the side bracket **800** can be firmly clamped to the channeled rail **600**.

FIG. 18 is a front view showing an operation of the side bracket for holding the sprinkler joint according to the third embodiment of the present invention. This drawing shows the predetermined locations of the first and second locking pieces **852** and **854**.

In other words, the locations of the first and second locking pieces **852** and **854** may be determined such that when the locking shaft **846** is rotated about the rotating shafts **844**, the diametric centerlines of the rotating shafts **844** can coincide with the centerlines of the first and second locking pieces **852** and **854**.

Further, when the locking shaft **846** is rotated, the locking shaft **846** comes into contact with upper ends of the first and second locking pieces **852** and **854**. At this time, the range of the angle of the locking shaft **846** may be set to about 30° to 35°.

The above-mentioned range of the angle of the locking shaft **846** is determined such that the locking shaft **846** can be easily inserted into the fitting slits **852a** and **854a** and can be firmly engaged with the locking piece part **850**. Here, it is most preferred that the angle of the locking shaft **846** that is brought into contact with the first and second locking pieces **852** and **854** is set to 31°.

Further, the fitting slits **852a** and **854a** may be configured such that when the locking shaft **846** is completely fitted into the fitting slits **852a** and **854a**, the locking shaft **846** can be placed horizontally. In other words, the shaft holes **814** into which the rotating shafts **844** are inserted are formed at the same heights as the heights of the lower ends of the fitting slits **852a** and **854a** into which the locking shaft **846** is fitted, so that when the locking shaft **846** is completely fitted into the fitting slits **852a** and **854a**, the locking shaft **846** can be placed horizontally.

Here, the locking shaft **846** may be configured as a hollow pipe. When the locking shaft **846** has a hollow pipe shape, an axial slit **846a** may be formed on the locking shaft **846** so as to give a clearance to the locking shaft **846**.

The axial slit **846a** may be formed along the lower part of the locking shaft **846**, as shown in the enlarged views of FIGS. 16 and 20.

When the axial slit **846a** is formed along the lower part of the locking shaft **846** as described above, the clearance of the locking shaft **846** acts in a transverse direction of the locking shaft **846** (in the transverse direction in FIG. 20).

The locking shaft **846** in which the clearance acts in the transverse direction of the locking shaft **846** as described above can be easily inserted into the fitting slits **852a** and **854a** while being rotated about the rotating shafts **844**.

Further, when the locking shaft **846** is fitted in the first and second fitting slits **852a** and **854a**, the pair of support sides **810** is intended to be opened in opposite directions. At this time, due to the axial slit **846a**, the locking shaft **846** is elastically opened in the fitting slits **852a** and **854a** so that the locking shaft **846** prevents the support sides **810** from being opened in the opposite directions.

Here, as shown in the enlarged view of FIG. 20, the axial slit **846a** may be configured such that the opposed edge surfaces of the axial slit **846a** are inclined to be further opened as the axial slit **846a** goes in a radially outward direction toward the outer circumferential surface of the locking shaft **846**.

FIG. 16 is a side view showing an open state of the side bracket having the space adjustment unit according to the third embodiment of the present invention. FIG. 17 is a sectional view showing the side bracket for holding the sprinkler joint according to the third embodiment of the present invention.

The lengths of the rotating shafts **844** of the present invention may be determined such that even when the support sides **810** are opened from each other as shown in FIG. 16, the rotating shafts **844** can be maintained in the respective shaft holes **814**. Thus, the assembled state of the space adjustment unit **840** with the support sides **810** can be always maintained.

Hereinbelow, the operation of the side bracket for holding a sprinkler joint according to the third embodiment of the present invention will be described.

To clamp the square bar **500** to the two channeled rails **600** that are arranged in parallel at regular intervals in a ceiling so as to hold ceiling boards, the side brackets **800** are placed on the two channeled rails **600**, respectively. At this time, the locking shaft **846** of the space adjustment unit **840** is placed in an upright position at a location between the pair of support sides **810**, as shown in FIG. 16.

Thereafter, the clamp parts **830** of each of the side brackets **800** are fitted over a wing **630** of an associated channeled rail **600**, and the pair of support sides **810** is compressed while holding the support sides **810** by hand, thereby reducing the gap between the support sides **810** such that the first and second fitting slits **852a** and **854a** of the first and second locking pieces **852** and **854** are aligned with each other.

Thereafter, the locking shaft **846** is rotated to be inserted into the aligned first and second fitting slits **852a** and **854a**. Thus, the clamp parts **830** are compressed to be clamped to the wing **630** of the channeled rail **600**, thereby firmly clamping the side bracket **800** to the channeled rail **600**.

At this time, although the pair of support sides **810** is intended to be opened in opposite directions, the locking shaft **846** that is fitted in the first and second fitting slits **852a** and **854a** is elastically opened due to the axial slit **846a**, so that the locking shaft **846** can prevent the support sides **810**

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from being opened in the opposite directions and can efficiently maintain the clamped state of side bracket **800** on the channeled rail **600**.

Although a preferred embodiment of the present invention has been described for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

What is claimed is:

1. A side bracket for holding a sprinkler joint, the side bracket being used to clamp a square bar to two channeled rails, the channeled rails being arranged in parallel at regular intervals so as to hold ceiling boards, with horizontal wings provided along opposite side edges of each of the channeled rails, and the square bar crossing the two channeled rails, the side bracket comprising:

- a pair of support sides;
- an upper connection part connecting upper ends of the support sides;
- clamp parts provided on lower ends of the support sides so as to be clamped to a channeled rail; and
- a space adjustment unit provided on lower parts of the support sides of the side bracket, said space adjustment unit including:
  - a fixed part fixed to an inner surface of a remaining one of the support sides;
  - a pair of elastic parts extending upward from the fixed part and having elasticity;
  - a pair of pressing parts bent outward from the elastic parts; and
  - a pair of grip parts extending upward from the pressing parts,

wherein a guide hole is provided on one of the pair of support sides, and the space adjustment unit passes through the guide hole.

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2. The side bracket of claim 1, wherein the space adjustment unit further includes:

a fitting plate that can be fitted into a gap between the pair of pressing parts, the fitting plate being configured such that when the fitting plate is fitted into the gap between the pair of pressing parts, the fitting plate pushes the pressing parts in opposite directions, thereby holding the pressing parts at opened positions, and such that the fitting plate can be removably fitted into the gap between the pair of pressing parts by being slidably moved while being in contact with the support side having the guide hole; and

a holder that is provided on the support side having the guide hole so as to hold the fitting plate such that even when the fitting plate is removed from the gap between the pair of pressing parts, the fitting plate is maintained in a contact position on the support side having the guide hole.

3. A side bracket for holding a sprinkler joint, the side bracket being used to clamp a square bar to two channeled rails, the channeled rails being arranged in parallel at regular intervals so as to hold ceiling boards, with horizontal wings provided along opposite side edges of each of the channeled rails, and the square bar crossing the two channeled rails, the side bracket comprising:

- a pair of support sides;
- an upper connection part connecting upper ends of the support sides;
- clamp parts provided on lower ends of the support sides so as to be clamped to a channeled rail; and
- a space adjustment unit provided on lower parts of the support sides of the side bracket, wherein the space adjustment unit is made of a plate spring material and a guide hole is provided on one of the pair of support sides, and the space adjustment unit passes through the guide hole.

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